

is one of the most serious menaces to the health and life of every community. How dangerous this practice is has been well demonstrated in a recent case, when a substitute for a chemical which was intended as an eye lotion resulted in the loss of the patient's eye, and in the recovery of heavy damages from the substituting druggist.

Just now I received a circular from A. C. Smith, Windsor, Ontario, Canada, one of the veteran dealers in this class of goods which circular in fact prompted me to write this article. I would ask you to read carefully the following sentence taken from it:

"You are taking an awful chance by buying elsewhere; it is a crime to buy rank imitations and short weight tablets peddled by every Tom, Dick and Harry, whose sole desire is to get all the profit possible irrespective of quality. You owe it to yourself and customers to buy these chemicals only from a reliable source. I positively cannot recommend anyone to you. I am retiring from business with a clean slate—honorably. No man will ever find me ungrateful or dishonorable."

Could there be better proof than these statements, made by a man who knows the truth of the nefarious dealings of these peddlers? How humiliating for us druggists that we must allow ourselves to be advised by that man not to take any chances in buying goods from his competitors!

Retail druggists as well as physicians should take pride in their honorable calling, and in their profession, and should not buy their supplies from irresponsible parties. This, in my opinion, is the curse of the retail trade of today, and the sooner this will be abolished, the better it will be for professional pharmacy.

We pride ourselves on our high state of civilization, but I doubt whether conditions in this particular are anywhere as bad as in the United States; not in the darkest part of Mexico would it be possible for peddlers to sell medicines and no druggist could be found who would stoop as low as to buy supplies from notorious criminals.

It has been rumored that Mayor-elect Mitchell will appoint Dr. H. W. Wiley, Commissioner of Health of the City of New York. Let us hope that this will be done and that Dr. Wiley will begin his activities by putting an end to these criminal practices in New York City which would have a beneficial effect all over the United States.

A STUDY OF SPIRIT OF CAMPHOR TO SHOW THE EFFECT OF ADDED WATER.

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The camphor in spirit of camphor can readily be determined either by titration or, if the camphor be from the same source, by means of the polariscope, but the percentage of alcohol cannot be determined by the ordinary distillation method because of the volatility of the camphor. Upon the information that certain druggists were adding water to their spirit of camphor in order to save alcohol, a study was made with the aim of devising a method for the determina-

tion of the percentage of alcohol used in making the preparation and, since the polariscope method for the determination of camphor can be used in this laboratory, a study was also made of the effect of dilution of the alcoholic solutions of camphor on their polarimetric readings.

The method devised for the determination of the alcohol was similar to that suggested by Marden¹ for the determination of alcohol in tinctures of iodine. Known weights of pure camphor, conforming to U. S. P. requirements, were dissolved in ninety-five percent alcohol and the change in weight of a given volume of the mixture was determined per gram of camphor. For this work a weight pipette² was used which held 4.6990 grams of water at 20° C. It was found that one gram of camphor dissolved in 100 cc. changed the weight of this volume of liquid .00340 grains. The use of this factor is best shown by an example:

$$\begin{array}{r} \text{Grams of camphor per 100 cc.} = 10.00 \\ \text{Wt. (of pipette full) of the liquid} \dots\dots\dots = 4.0420 \\ \text{.00340 multiplied by 10.00} \dots\dots\dots = \underline{.0340} \\ \text{Corrected weight} \dots\dots\dots = 4.0080 \\ \hline \frac{4.0080}{4.6990} = 0.8529 = \text{Sp. Gr. of Alcohol} = 83.98 \text{ per cent.} \\ \text{83.81 percent alcohol was used in making this preparation.} \end{array}$$

The following table shows some of the results obtained in this way and calculated as above.

TABLE I.

Gms. Camphor per 100 cc.	Wt. of Spirit	% Alc. used in preparation	% Alc. by calculation	Difference
2.00	3.8072	97.05	96.85	-.20
4.00	3.8140	97.05	96.85	-.20
4.00	4.0180	84.34	84.24	-.10
5.00	4.1562	73.54	73.61	+.07
6.00	4.2602	64.97	64.93	-.04
6.00	3.8310	97.05	96.34	-.71
7.00	4.2204	68.36	68.68	+.32
8.00	4.1235	77.36	76.96	-.40
9.00	4.1312	76.20	76.72	+.52
10.00	4.0420	83.81	83.98	+.17
12.00	3.9700	89.41	89.36	-.05

It is to be seen readily from this table that the percentage of alcohol can be determined by this method with a very fair degree of accuracy. It must be admitted that this factor gives somewhat better results with the lower percentages of alcohol and lower concentrations of camphor. It is, however, only in a spirit that is low in camphor that dilution with water is to be expected. Under good conditions the above method should give within 0.5 percent of the true percentage of alcohol used in making the preparation.

It was found that polarimetric readings of solutions of a given number of grams of camphor dissolved in 95 percent alcohol were not the same as when the same weights of camphor were dissolved in more dilute alcohol. Solutions of varying strengths of both camphor and alcohol were therefore polarized and

¹This Journal, November, 1913.

²Mulliken, Identification of Pure Organic Compounds. Vol. I, page 229.

the results compared with those obtained with 95 percent alcohol. The following table shows these differences.

TABLE II.

No.	Gms. Cam. found with 95% Alc.	Gms. Cam. in Dil. Alc.		Dif. in Gms. of Cam.	Gms. Cam. low % of Alc.
		% Alc.	Gms. Cam.		
1	4.00	84.34	3.40	.60	.055
2	5.00	73.54	4.66	.34	.016
3	6.00	64.97	4.95	1.06	.035
4	7.00	68.36	6.30	.70	.026
5	8.00	76.96	7.50	.50	.028
6	9.00	76.20	8.40	.60	.032
7	10.00	83.81	9.40	.60	.054
8	12.00	89.42	11.80	.20	.036

Average, .035

The last column represents the value given in column (5) divided by the number of units of percentage that the alcohol given in column (3) is below 95 percent. Although these polarizations were done with a polariscope which does not allow great accuracy, yet it is apparent that there is a very nearly constant decrease of the grams of camphor per 100 cc. found by this method with the decrease in the percentage of alcohol. This decrease in grams of camphor is fairly large and the average value of column (6), .035, equals the number of grams low which spirit of camphor read in the polariscope for each unit percent that the alcohol used in its preparation is below 95 percent. In the case of No. 3, only 4.95 grams were observed. Since the difference of one gram of camphor would change the percentage of alcohol by calculation but a few tenths of a percent, the grams of camphor found by the polariscope could be corrected by multiplying the difference between 9 percent and the percent of alcohol found by .035 and adding this value to the grams of camphor already found by means of the polariscope. For example, a sample was found to contain 4.95 grams of camphor and that 65 percent alcohol was used in its preparation.

$$95 - 65 = 30, \text{ and } 30 \times .035 = 1.05,$$

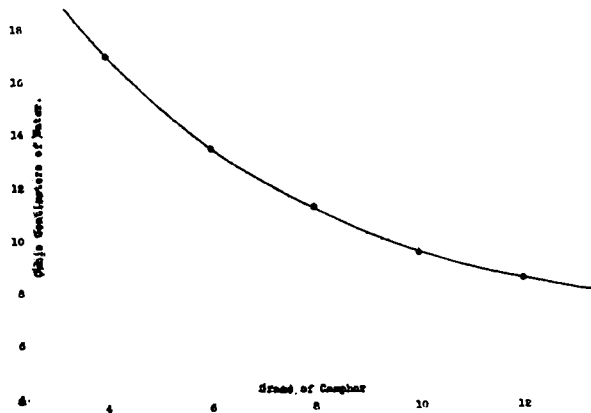
1.05 + 4.95 = 6.00 grams. The sample contained 6.00 grams of camphor per 100 cc. (No. 3, Table II).

Another method was devised to serve as a check upon the specific gravity method for the determination of added water. It was found that 10 cc. of the spirit of camphor of a definite concentration always took the same volume of water to produce a permanent precipitate and that spirit that contained added water took correspondingly less water to produce a permanent precipitation. The following table (a) gives the cc. of water necessary to give a permanent precipitate in 95 percent alcohol and table (b) the volumes of water necessary to cause a permanent precipitate in more dilute alcoholic solutions.

TABLE III.

(a)			(b)			
Gms. Cam. per 100 cc.	Cc. of Spirit.	Cc. H ₂ O	Gms. Cam. per 100 cc.	Cc. of Spirit.	% Alc.	Cc. H ₂ O.
4.00	10.0	17.0	4.00	10.0	84	12.4
6.00	10.0	13.5	6.00	10.0	65	3.6
8.00	10.0	11.3	8.00	10.0	77	5.8
10.00	10.0	9.5	10.00	10.0	84	6.3
12.00	10.0	8.5	12.00	10.0	89	7.8

The values given in Table III (a) are plotted on the accompanying diagram and from the curve the volume of water can be read that any concentration of camphor dissolved in 95 percent alcohol should take to form a permanent precipitate.



A table is given below to show the results of these experiments on a number of samples of spirit of camphor which were found low in camphor and were tested for added water.

TABLE IV.

No.	Gms. Cam. found per 100 cc.	% Alc. by calc.	Cc. H ₂ O to titrate 100 cc. Sp. Cam.	Dif. from standard value.
1.....	6.10	93.2	12.0	-1.0
2.....	8.47	94.9	10.5	-0.3
3.....	5.5 (6.5) corr.	67.7	4.2	-10.0
4.....	8.24	94.3	10.7	-0.3
5.....	8.37	94.3	10.7	+0.1
6.....	8.78	94.5	10.4	-0.2
7.....	9.22	94.1	9.7	-0.5
8.....	9.04	94.9	10.4	0.0
9.....	8.8 (9.2) corr.	83.2	7.7	-2.9
10.....	7.06	94.1	11.7	-0.5
11.....	9.00	94.1	10.2	-0.2

It will be noticed that in all cases except three the percentage of alcohol does not exceed 94.9 percent (the U. S. P. strength) or is it less than 94.1 percent, making a total variation of only 0.8 percent. In the three cases where the percentage of alcohol is low the volume of water necessary to produce a permanent precipitate is abnormally low indicating that some water is already present. Excepting these three cases the volume of water is in no instance more than 0.5 cc. away from the standard value. Numbers 3 and 9 have been considerably diluted. Number 1 may have been put into a wet bottle in its preparation, but the percentage of alcohol is not low enough to consider the sample adulterated.

The factor for the determination of alcohol can be restated so as to be used in any specific gravity apparatus. The grams of water necessary to fill the pycnometer used for the determination at 20° C. multiplied by .000723 will give the factor for that apparatus.

CONTRIBUTED FROM THE SOUTH DAKOTA STATE FOOD AND DRUG LABORATORY,
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